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Denham et al.

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[45] **Date of Patent: Jul. 6, 1999**

[54] **SHOWERHEAD WITH VARIABLE SPRAY PATTERNS AND INTERNAL SHUTOFF VALVE**

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[73] Assignee: **Speakman Company**, Wilmington, Del.

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[51] **Int. Cl.**[6] **B05B 15/02**

[52] **U.S. Cl.** **239/123**; 239/437; 239/444; 239/581.1; 239/DIG. 1; 251/347

[58] **Field of Search** ..... 239/391, 393, 239/436, 437, 460, 554, 555, 581.1, 583, DIG. 1, 114, 123, 138, 442, 443, 444, 448, 449; 251/347, 259

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Primary Examiner—Andres Kashnikow
Assistant Examiner—Lisa Ann Douglas
Attorney, Agent, or Firm—Connolly & Hutz

[57] **ABSTRACT**

A water discharge device in the form of a showerhead is disclosed having multiple features including a rotating shut-off valve incorporated in the body of the device. Variable discharge patterns are achieved by rotation of a handle on the side of the device. These patterns include a vibrating spray, a columnar spray pattern and cone shaped spray pattern. All patterns are achieved at low flow rates.

24 Claims, 5 Drawing Sheets

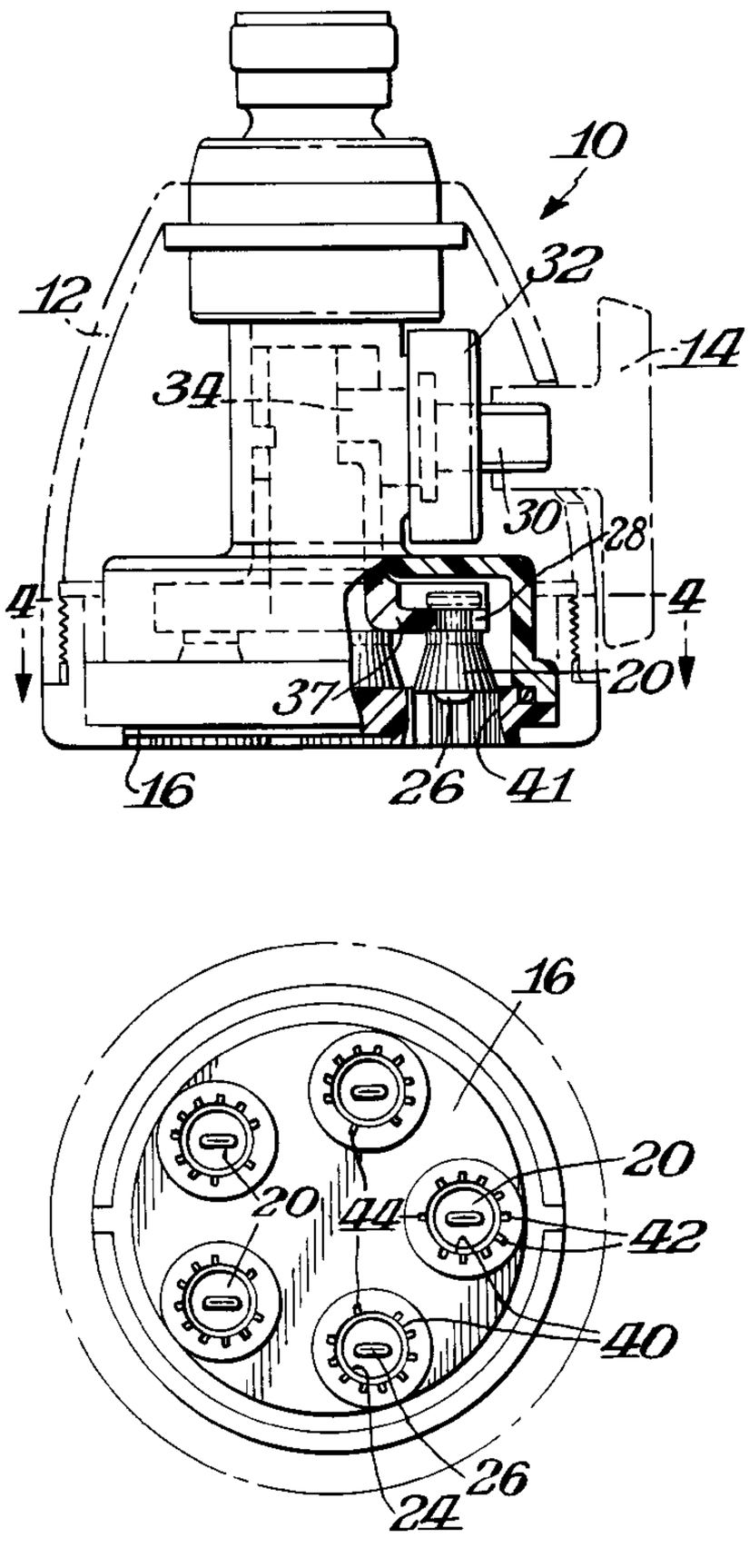

Fig. 1.

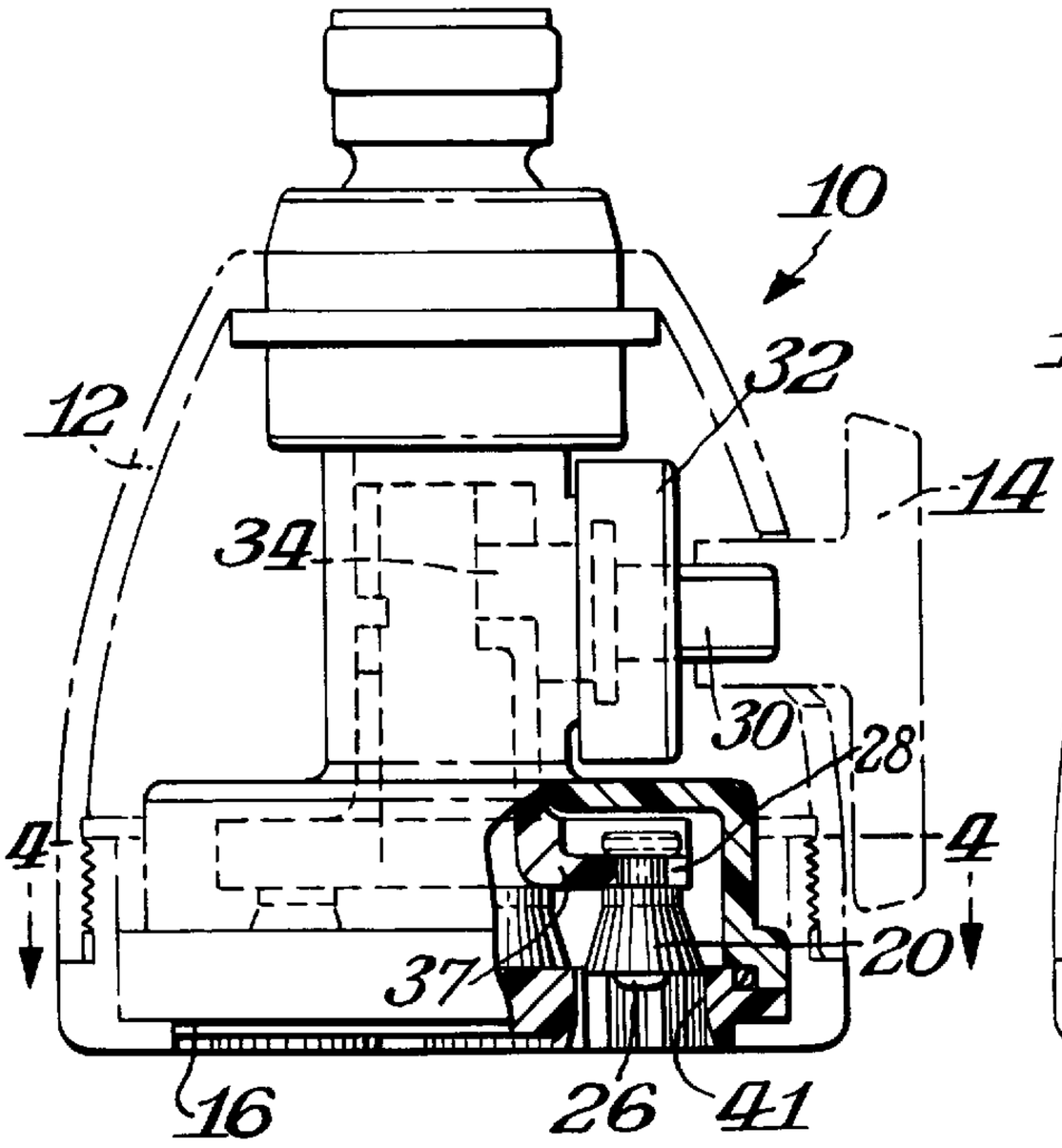

Fig. 2.

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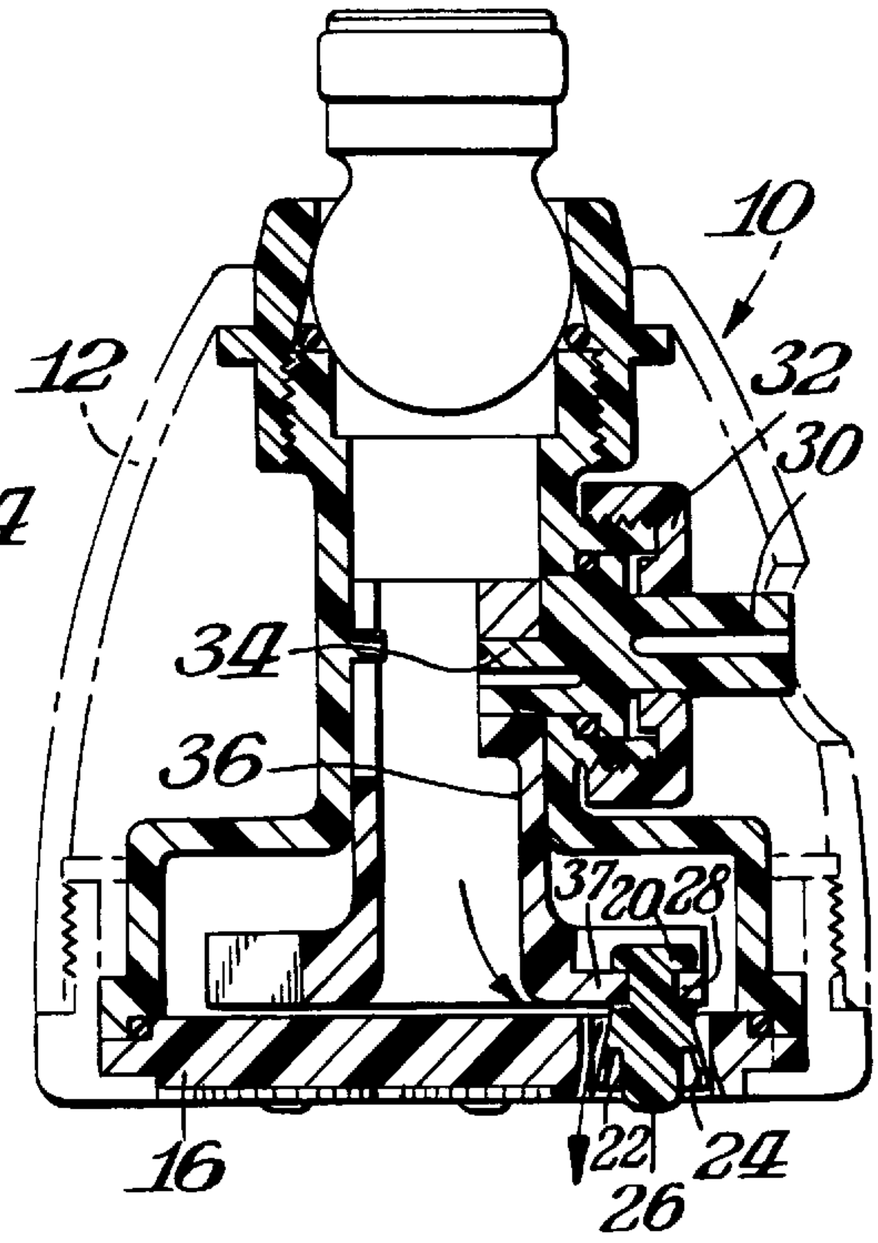

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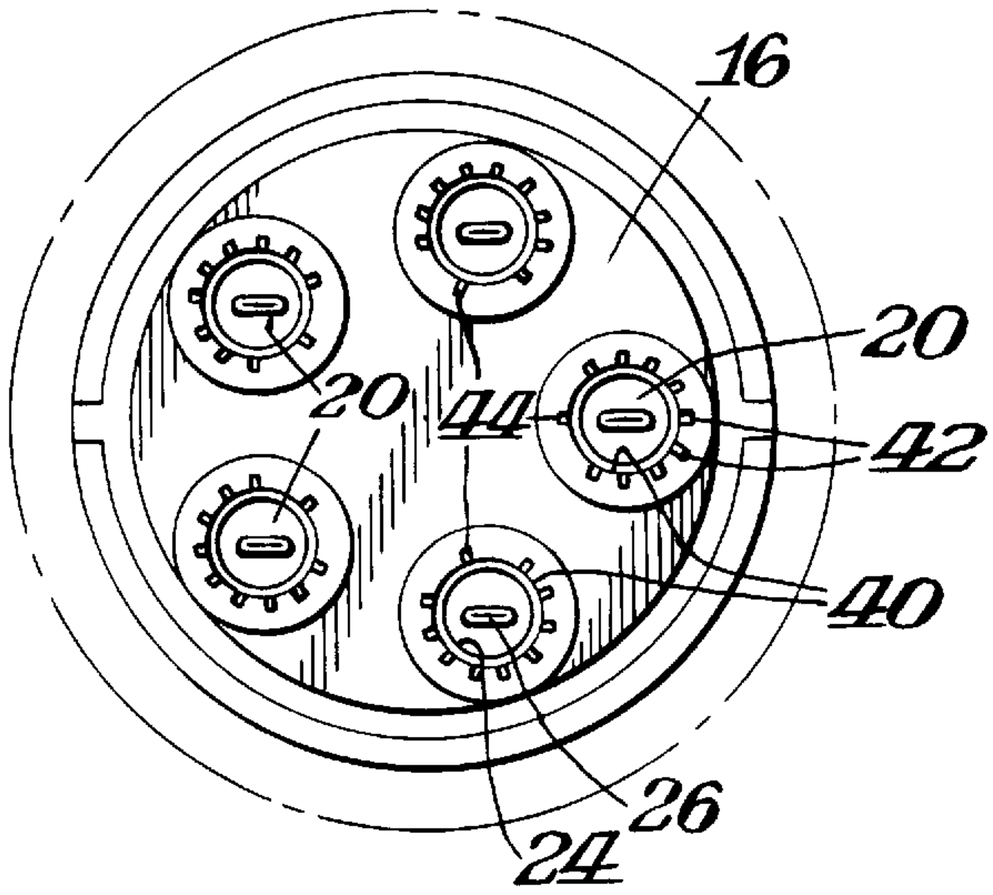


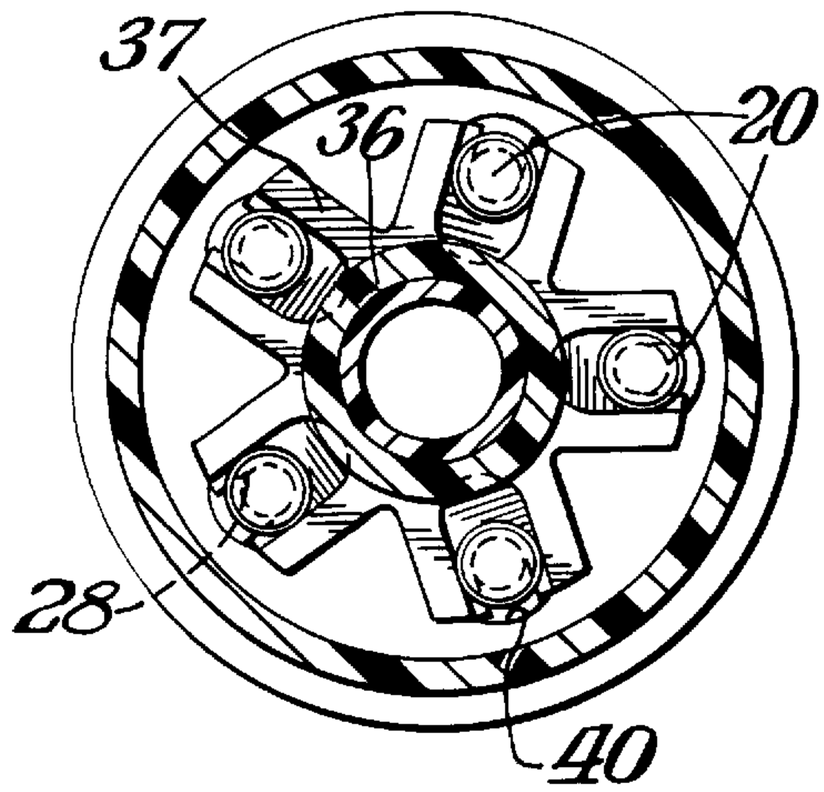


Fig. 5.

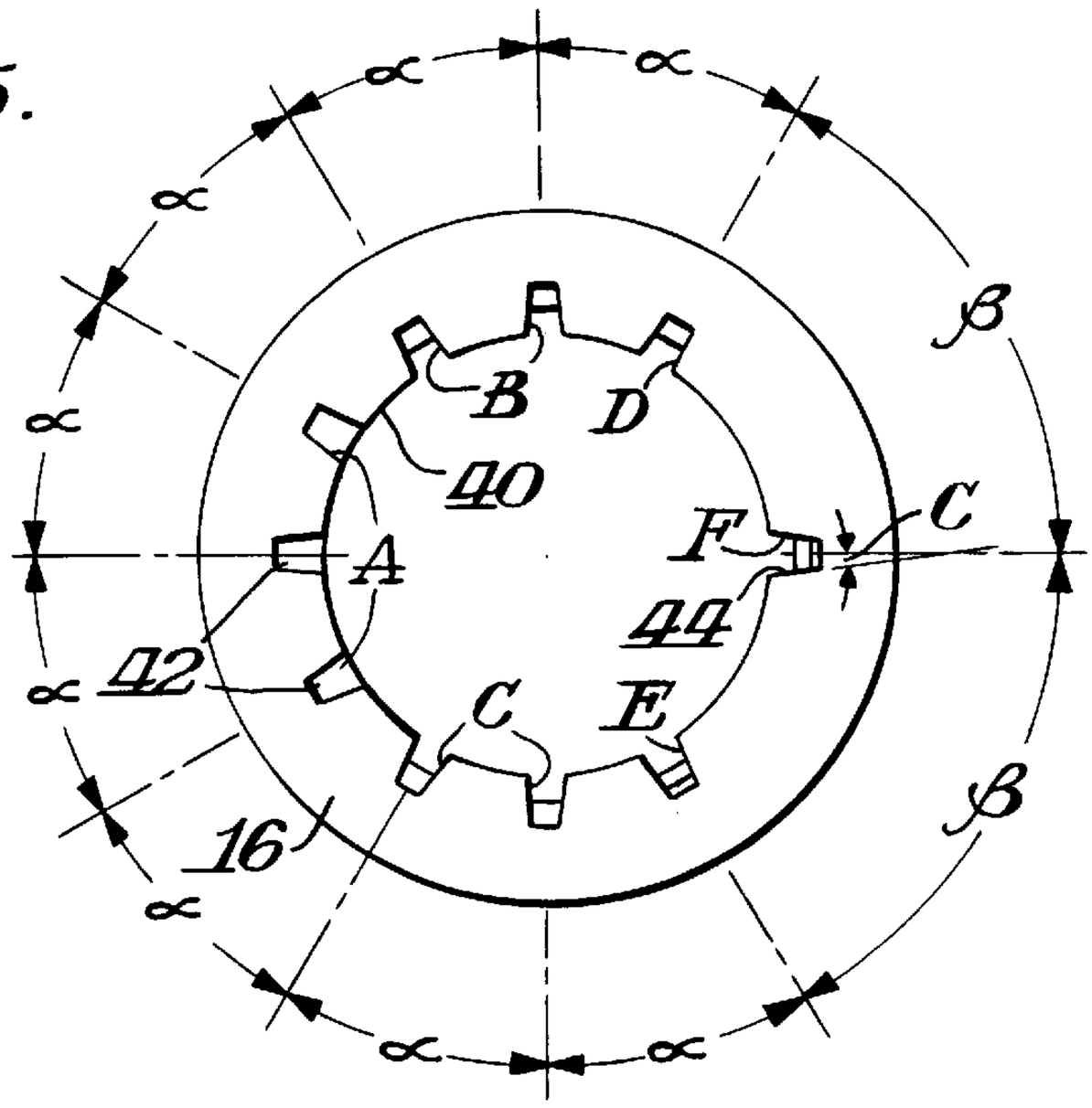


Fig. 6A.

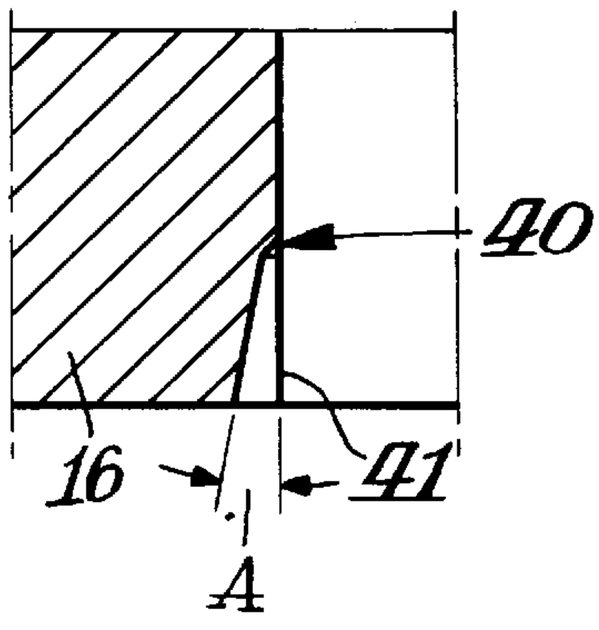


Fig. 6B.

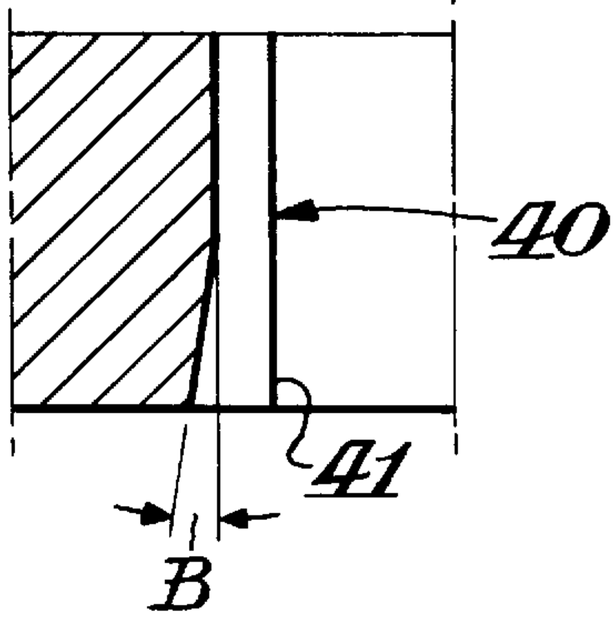


Fig. 6C.

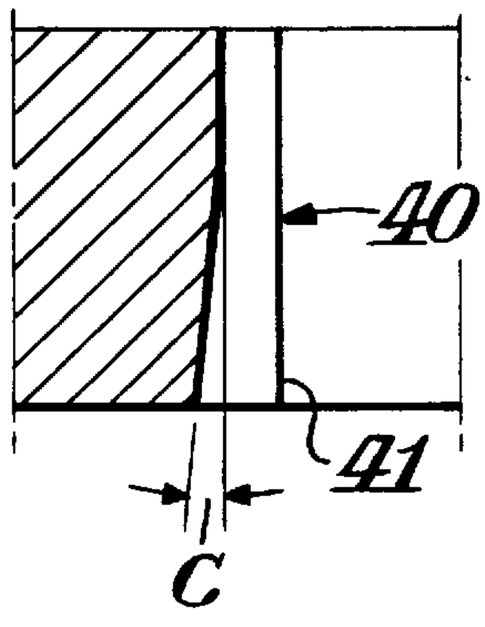


Fig. 6D.

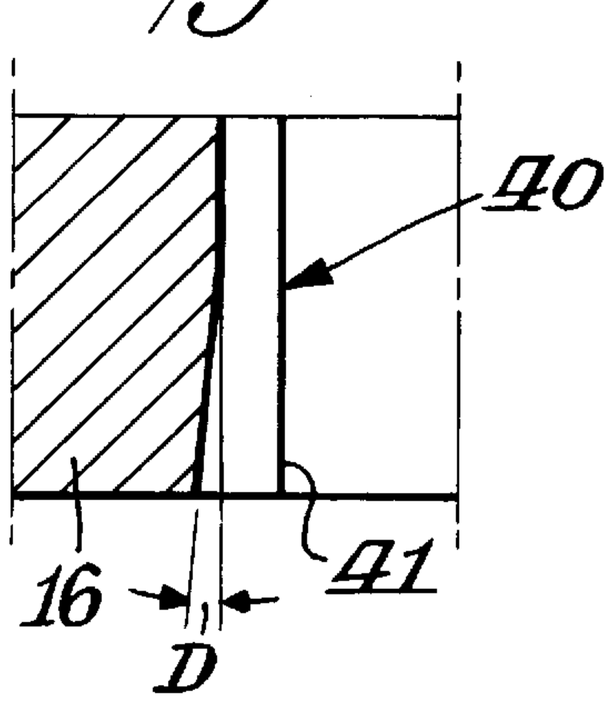


Fig. 6E.

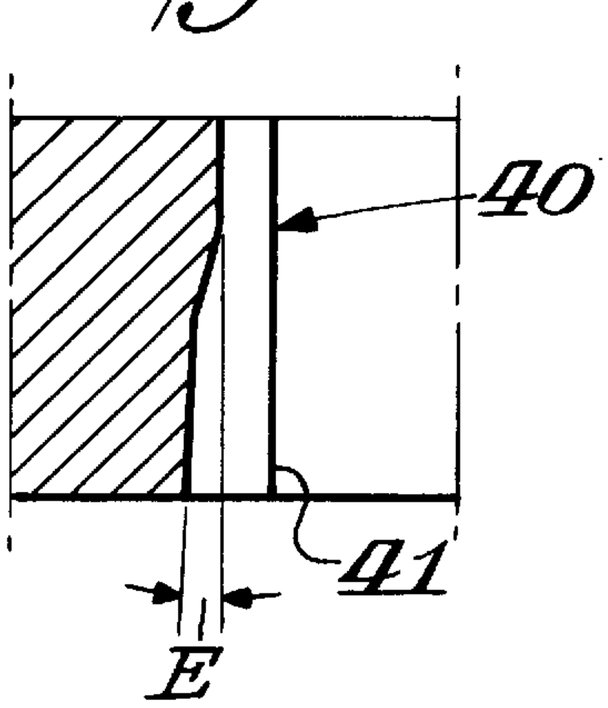
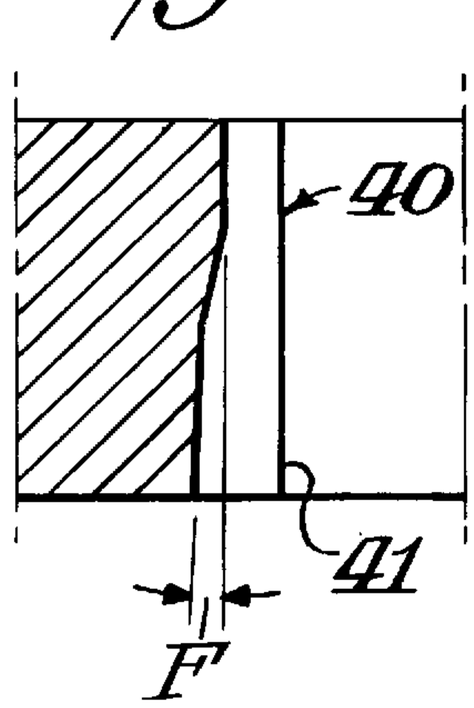


Fig. 6F.



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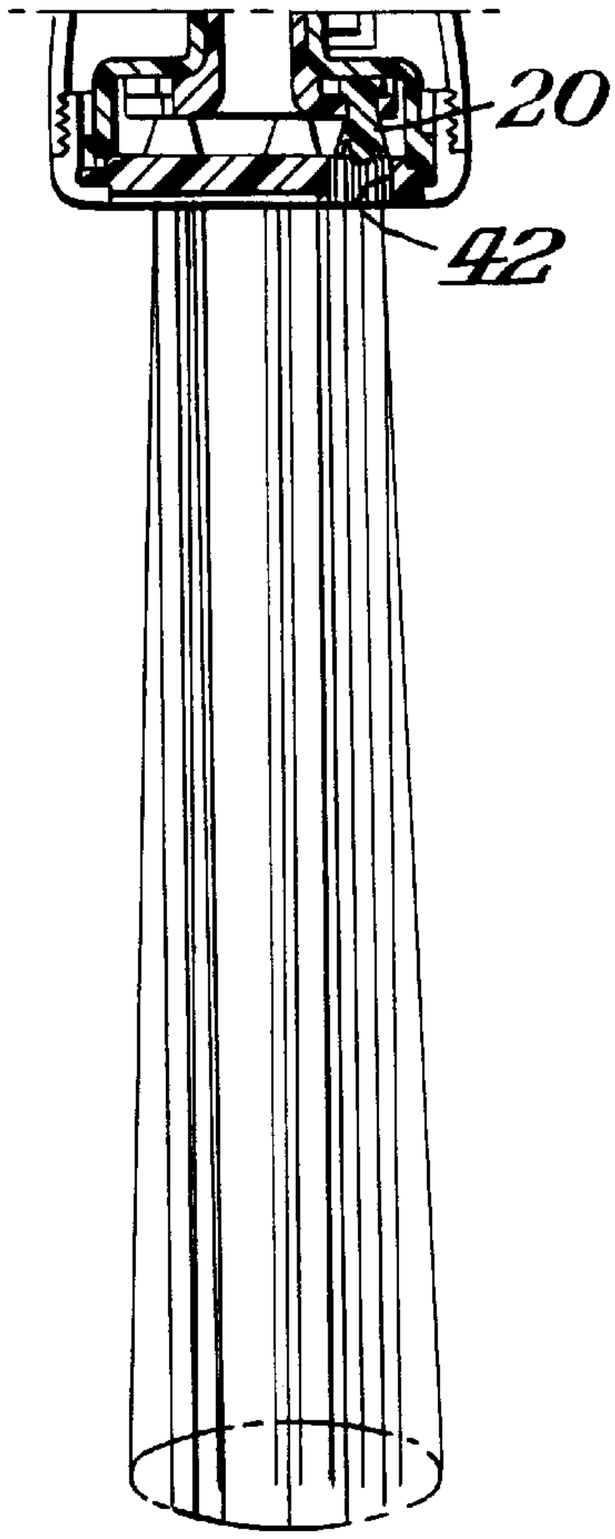
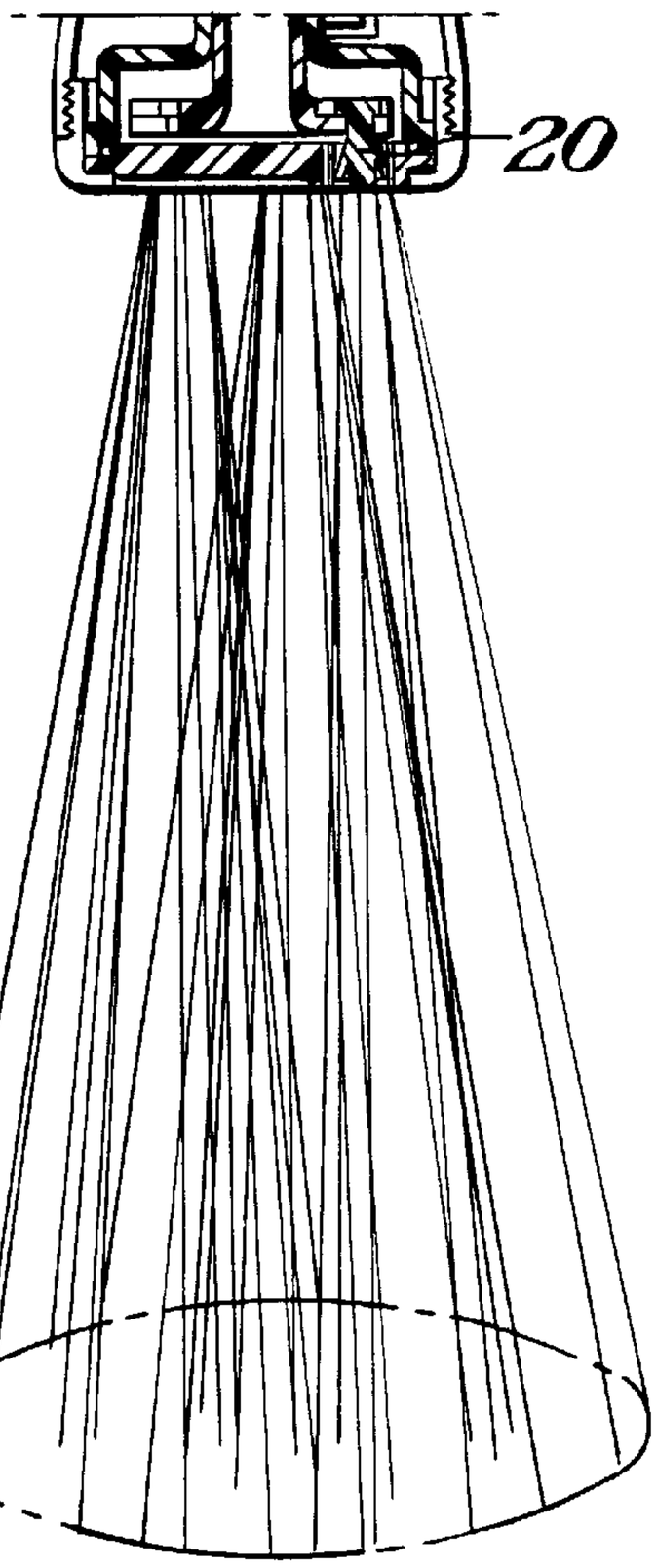


Fig. 8.



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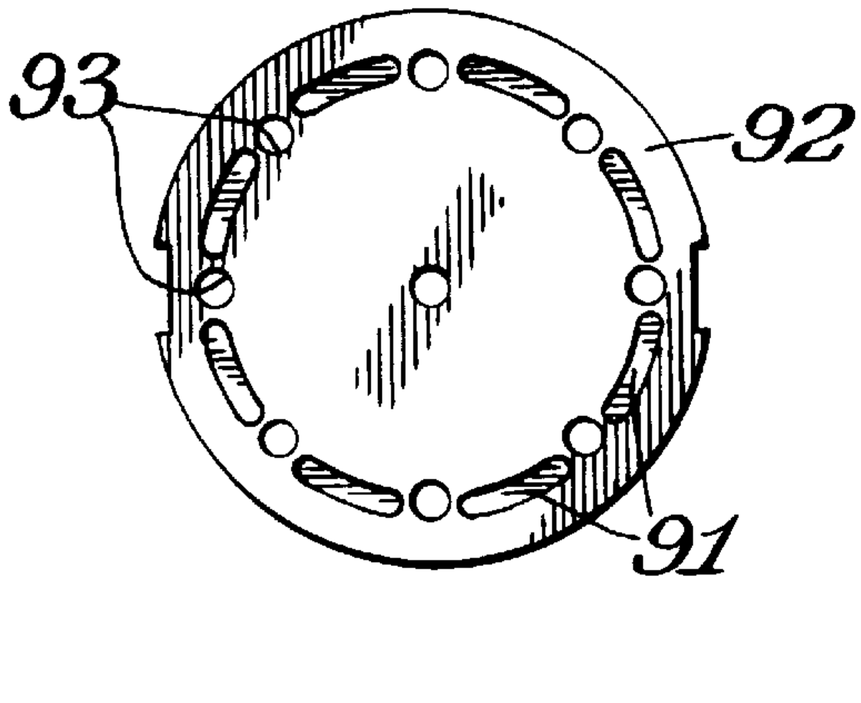
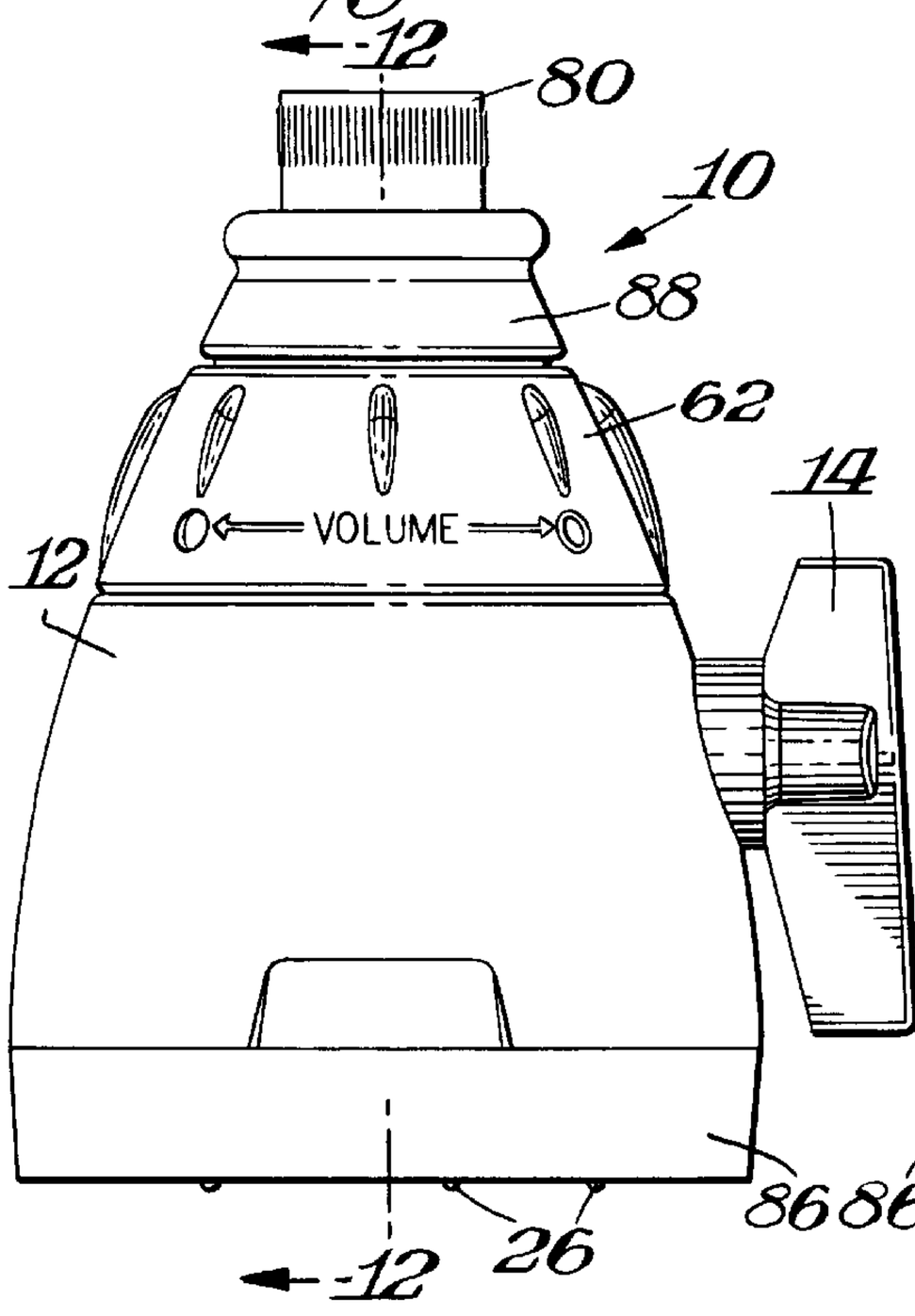


Fig. 9.



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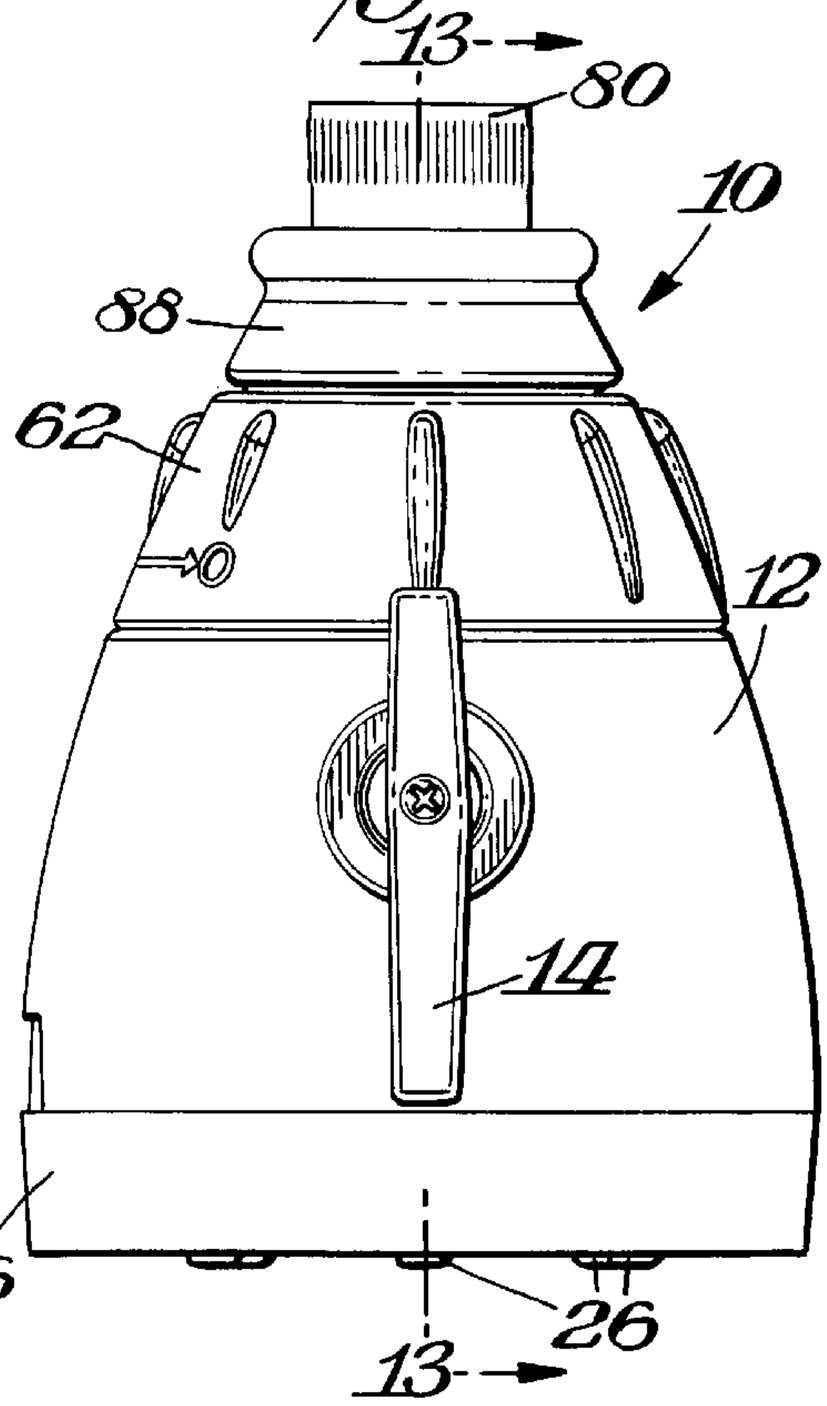

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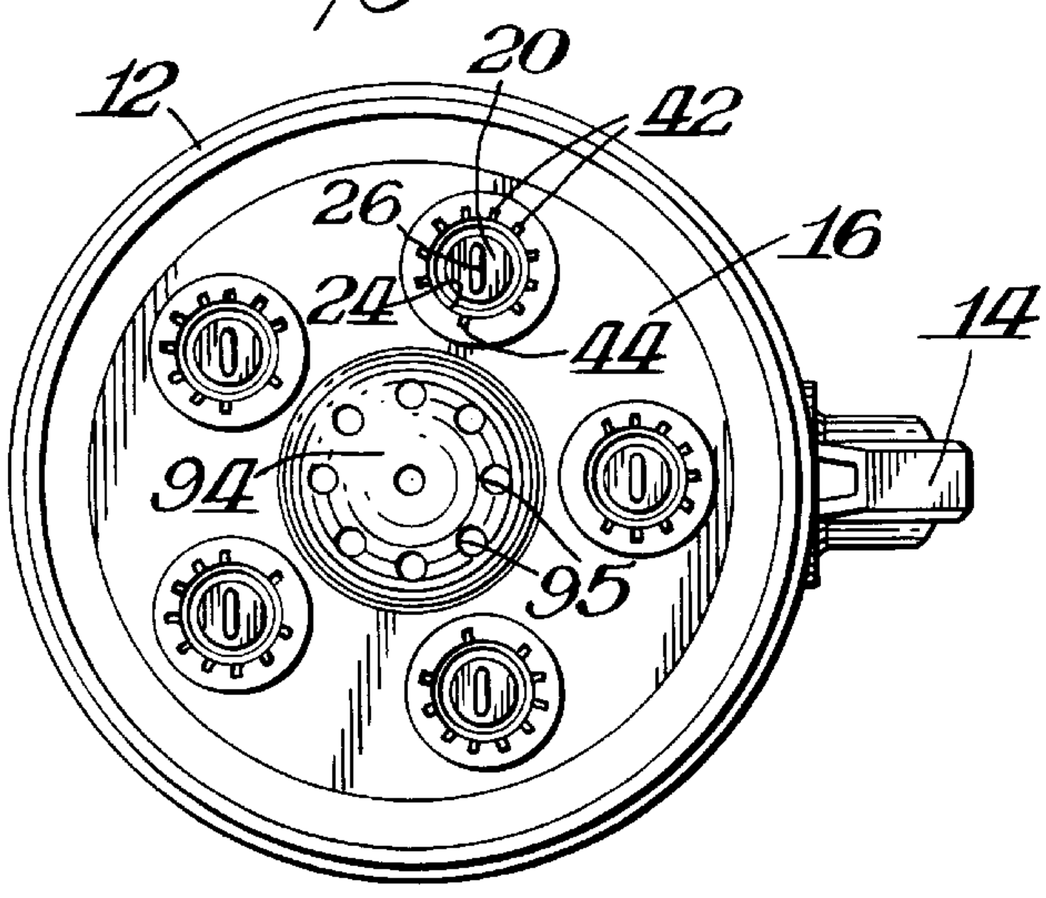

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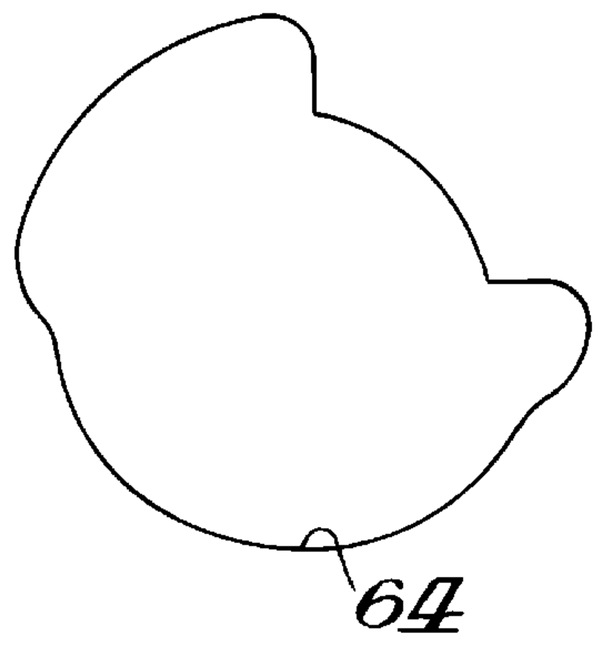

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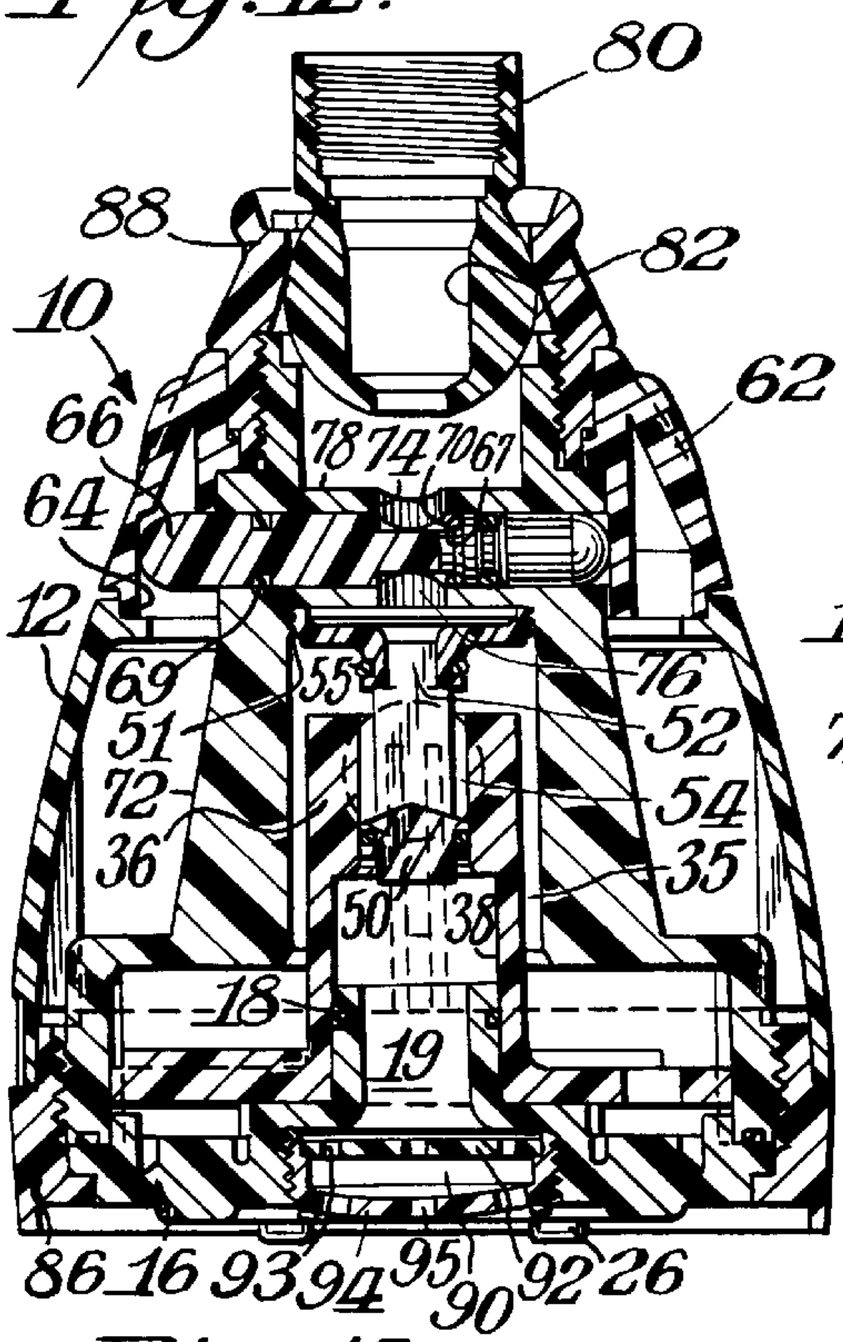

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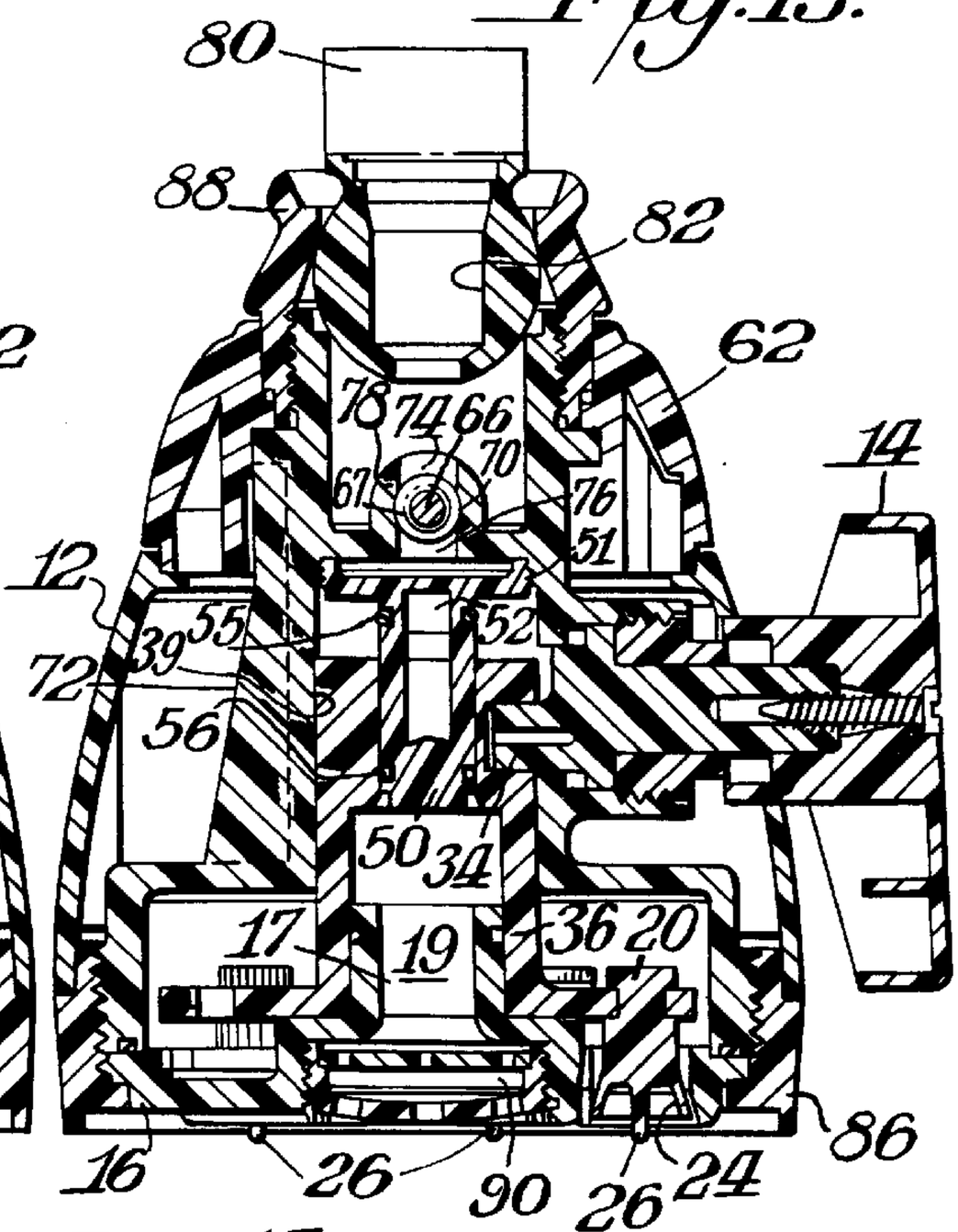

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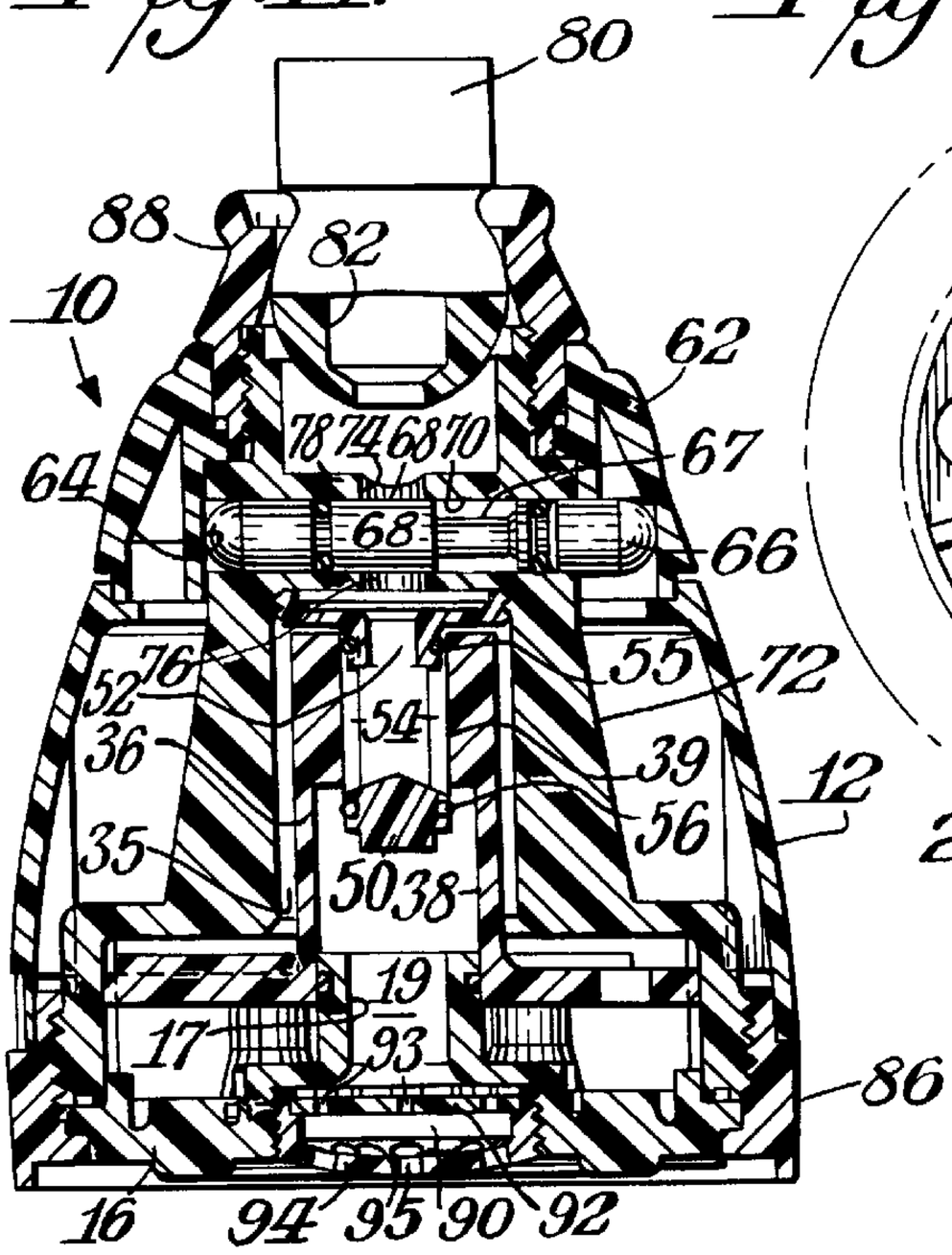
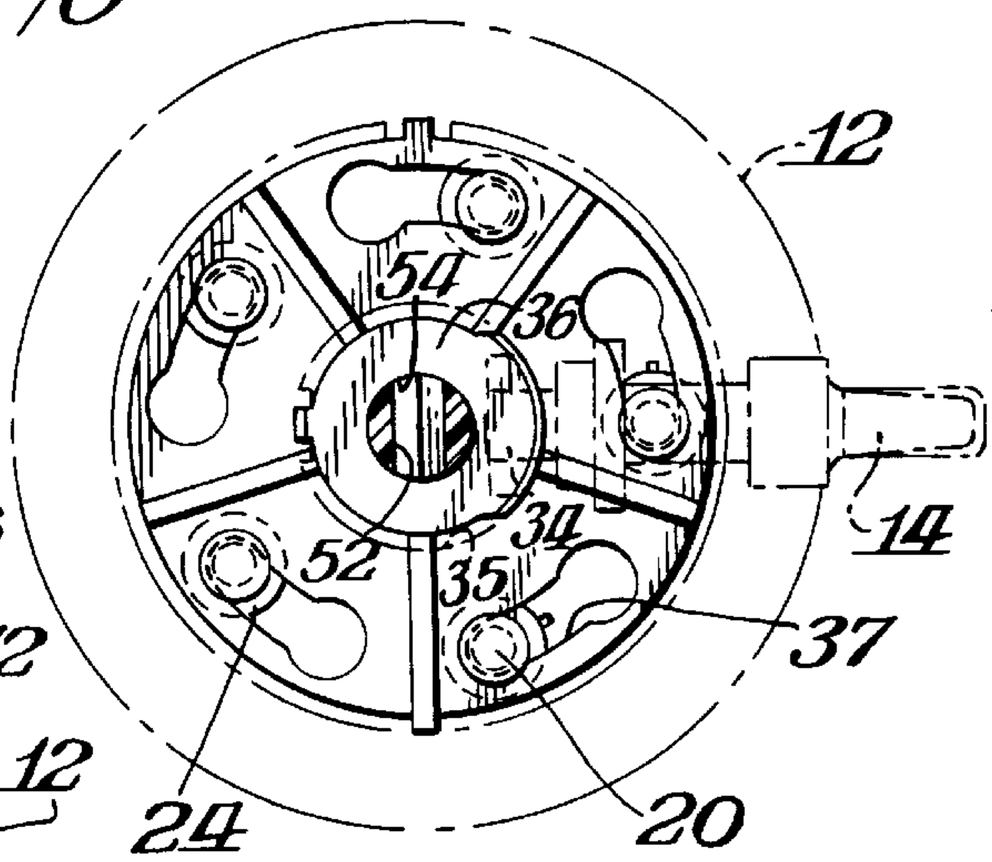


Fig. 15.



SHOWERHEAD WITH VARIABLE SPRAY PATTERNS AND INTERNAL SHUTOFF VALVE

BACKGROUND OF THE INVENTION

Applicant's assignee, Speakman Company, is a pioneer in the field of adjustable spray pattern showerheads. These are sold under the ANYSTREAM trademark throughout the world. Numerous patents have been obtained by Speakman describing details of such showerheads. These include: McLean U.S. Pat. No. 3,013,729; Fraser U.S. Pat. No. 3,065,917; Roman et al U.S. Pat. No. 3,373,942; Fiorentino U.S. Pat. No. 3,383,051; and Lagarelli U.S. Pat. No. 4,117,979. Another type of adjustable spray showerhead is illustrated in Stacey U.S. Pat. No. 3,563,469.

One of the problems encountered with these prior art showerheads is loss of spray pattern integrity at low flow conditions currently mandated by state law as a water conservation measure. A national standard (ANSI-ASME A112.8.1 M-1994) has recently been adopted pursuant to the Energy Policy and Conservation Act of 1992 that limits flow through showerheads to 2.5 gallons per minute. A comparable standard has been adopted in Canada (CAN/CSA-B125-M89). Under low flow and low pressure conditions, the spray pattern in some of the prior art showerheads tends not to fill all of the grooves in the plungers of the showerheads described above. This causes erratic and uneven spray patterns. Most showerhead users want, and expect, a uniform spray of even intensity under all flow conditions.

Another problem with some of the showerheads described above is clogging of the grooves in the plungers. This clogging is aggravated where a hard (mineral laden) water supply is used. The buildup of mineral deposits can get so bad that the plungers actually "freeze" in position, thereby disabling, or limiting, the spray adjustment feature of the showerhead. Various approaches to resolution of this problem have been proposed, including use of specific materials or some form of wiping action across openings in the faceplate of a showerhead.

Another aspect of water conservation is the water lost during the non-rinse cycles of a showering experience. A shower spray is usually not wanted during the soap-up or hair shampooing part of the total showering cycle. Water flow during those portions of the shower is essentially wasted. Thus, there is a need for a showerhead that can reduce, or shutoff, water flow when not wanted, without affecting the spray patterns when showering is resumed. Although shutoffs are available, they are typically located upstream of the showerhead in the water supply piping. As such, they are hard to locate and operate by a typical user who may have his or her eyes shut to avoid the sting of soap or shampoo. Those shutoffs that are located on or in the showerhead are typically linked to the showerspray mechanism so that the spray pattern must be readjusted after each water shutoff.

Another disadvantage of existing showerheads is that most grooves used to create a spray pattern are uniform in cross section at any given plane taken through the showerhead. In other words, although the grooves may vary in depth as measured along the axis of the showerhead, few showerhead designers have paid attention to varying the placement of grooves and groove depth around the periphery of the showerhead opening to avoid overlap in spray patterns.

Numerous attempts have been made to provide a vibratory spray in showerheads and other water discharge

devices. Most devices used to create a vibratory spray utilize moving parts such as a turbine or off center wobble-plate to achieve the desired periodicity in the water spray. These parts are subjected to considerable wear and often cease to function when mineral deposits interfere with their freedom of movement.

Many showerheads are designed with one, maybe two, of the features discussed above: variable spray patterns, shutoff valve, vibratory spray, controlled spray pattern, self cleaning spray openings. Few have all of these features and none are designed to permit production of showerheads with a variable assortment of such features.

SUMMARY OF THE INVENTION

Applicants have addressed these deficiencies in the showerhead of this invention. More particularly, applicants have created a water discharge device usable as a showerhead, which provides a controlled, coherent spray pattern at very low flow. The individual spray streams emitted by applicants' water discharge device do not intersect in the region near the discharge end of the device due to the carefully controlled orientation of the spray patterns (see FIGS. **2** and **5**). This gives a very crisp feel to the spray streams because they are not distorted by bouncing off each other. This exhilarates the bather and enhances the rinsing action of applicants' showerhead.

Applicants' device also provides for a large variation in the intensity and spread of the spray pattern by carefully controlling the geometry of the individual groves surrounding discharge openings in the showerhead faceplate (see FIGS. **6**A–**6**F). An adjustable plunger can be moved longitudinally along those groves to adjust the flow volume and angular spread of the spray pattern emitted from the showerhead (see FIGS. **7**–**8**). Adjustable skirts on the plungers wipe a portion of the grooves to reduce clogging of the grooves and openings with mineral deposits (FIGS. **1** and **3**).

Applicants' water discharge device also contains a unique configuration of stationary plates at the center of the showerhead faceplate that discharge a vibratory spray pattern (FIGS. **9**–**10**). A simple twist of the handle on the side of the showerhead allows an instant change from a vibratory spray to regular spray pattern or vice-versa.

A unique cam operated valve integrated into the body of the showerhead permits infinite adjustment of water flow between full-on to full-off. A ring-like portion of the showerhead body's surface is linked to an internal cam surface that translates rotational movement to lateral movement of a shuttle valve that modulates, or shuts off, water flow through the showerhead (FIGS. **9**–**17**).

Applicants' device is completely modular in design so that the features noted above can be mixed and matched as the market dictates. A "barebones" version of the showerhead may only have the adjustable spray feature without the shutoff valve or vibratory spray. Conversely, all of the above features can be included in the same shell as the "barebones" model.

DESCRIPTION OF THE DRAWINGS

FIG. **1** is an outline in phantom of one embodiment of the showerhead of this invention with a partial breakaway cross section of the plungers seated in faceplate opening;

FIG. **2** is a bottom plan view of one embodiment of the showerhead of this invention illustrating the orientation and placement of grooves in the opening of the faceplate;

FIG. **3** is a vertical cross-sectional view of one embodiment of the showerhead of this invention illustrating the

mechanism used to raise and lower the skirted plungers within the grooved openings in the faceplate;

FIG. **4** is a horizontal cross-sectional view of the showerhead along lines **4**—**4** of FIG. **1**;

FIG. **5** is a diagrammatic view of the placement of grooves around the periphery of the faceplate openings;

FIGS. **6**A–F are partial vertical cross-sections of the grooves;

FIG. **7** is a diagrammatic view of one shower spray pattern achieved by applicant's invention;

FIG. **8** is diagrammatic view of another spray pattern achieved by applicant's invention;

FIG. **9** is a front elevational view of an alternate showerhead embodiment illustrating the external features of the rotating shutoff mechanism;

FIG. **10** is a right side elevational view of FIG. **9**;

FIG. **11** is a bottom plan view of FIGS. **9** and **10**;

FIG. **12** is a vertical cross-sectional side elevational view taken along line **12**—**12** of FIG. **9** showing the shuttle valve used to control water flow through the showerhead;

FIG. **13** is a vertical cross-sectional front elevational view taken along line **13**—**13** of FIG. **10** showing the showerhead containing a rotating shutoff mechanism and vibratory spray device;

FIG. **14** is a cross-sectional view similar to FIG. **12** showing the plunger holder in a retracted position;

FIG. **15** is a top plan view of the plunger holder of the alternative embodiment and showing the water diverter and selected parts in phantom; and

FIG. **16** is a pattern outline of the cam surface used to control the shuttle valve.

FIG. **17** is a top plan view of the upper plate in the vibratory spray device.

DETAILED DESCRIPTION OF INVENTION

One embodiment of applicants' showerhead **10** illustrated in FIGS. **1–8** contains a bell shaped outer housing **12** with a rotating handle **14** on the side used to vertically move a set of skirted plungers **20** within openings **40** of a faceplate **16**. FIGS. **1–8** illustrate the simplest configuration of that showerhead utilizing adjustable skirted plungers **20** coacting with uniquely configured grooves **42**, **44** about the periphery of openings **40** in faceplate **16**. In this embodiment neither a vibratory spray nor shutoff valve is used.

As shown in FIGS. **2** and **5** the grooves **42**, **44** are not uniformly spaced about the periphery of openings **40**. Grooves **42** are spaced at about 30° radians around approximately one-half of the periphery. The other half of the periphery, which faces the geometric center of the faceplate (See FIGS. **2**, **5**), contains fewer grooves, and preferably a relatively isolated groove **44** oriented toward the center of the faceplate **16**.

Vertically slidable within the openings **40** of faceplate **16** are the skirted plungers **20**. The plungers **20** wipe the surface **41** of the openings **40** of the faceplate **16** when the plungers move within the openings **40**. This wiping action also acts to dislodge any mineral buildup on the inner surface of grooves **42**, **44**. The vertical wiping movement of the plunger **20** is accomplished by the pressure exerted by the lower portion of the annular skirt **24** arranged around the lower end **22** of plunger **20**. In one embodiment of the invention the outer diameter of skirt **24** is approximately ten thousands of an inch (25 millimeters) larger than the diameter of openings **40**. Since the lower end of skirt **24** is thinner at this point, it slightly flexes to accommodate the dimensional difference while maintaining an outward pressure against openings **40** to effectuate the desired wiping action. This wiping helps to keep the openings **40** and grooves **42** and **44** relatively clear of deposits. To further enhance this wiping action each of the plungers **20** may contain a small tab **26** on the bottom thereof which can be used to rotate the plungers **20** within the openings **40** of faceplate **16** see FIG. **1**. This combination of vertical and rotational movement of plungers **20** greatly facilitates removal of mineral deposits in the openings **40** and grooves **42**, **44** of applicants' showerhead.

Vertical movement of plungers **20** is achieved by rotational movement of handle **14** on the side of showerhead **10**. The mechanical linkage translating rotational movement of handle **14** into vertical movement of plunger **20** in the embodiment illustrated in FIGS. **1–4** is similar to that disclosed and explained in McLean U.S. Pat. No. 3,013,729, the description of which is incorporated herein by reference. More particularly, the handle **14** has a shaft **30** extending into the interior of showerhead **10** and held in place by a packing nut **32** sealingly attached to the internal structure forming the fluid path through showerhead **10**. On its internal end shaft **30** contains an off-center pin **34**. This pin **34** is received in a slot in the side of tubular sleeve **36** which, at its lower (discharge) end flares out to form a fork-like prong **37** that fits into mating recesses **28** in plungers **20** (FIG. **4**). With this combination, a small rotation of handle **14** is translated into vertical movement of plungers **20**. An alternative, keyhole slot configuration for connecting plungers to tubular sleeve **36** is illustrated in FIG. **4**.

As illustrated in FIG. **5** and **6**A–F, the configuration of each groove **42**, **44** varies. Each of the grooves **42** labeled "A" in FIG. **5** has a groove cross-section as illustrated in FIG. **6**A, i.e., a short angled groove with outward taper **48** that only extends about a third of the way up the groove. Each of the other grooves **42** labeled as "B" to "E" in FIG. **5** has a different configuration as more fully described below and FIGS. **6**B to **6**E, with the relatively isolated groove "F" having a unique configuration of its own. This configuration and orientation of grooves **42**, **44** permits gradual adjustment of the spray pattern as plunger **20** is moved within opening **40**. When the skirt **24** of plunger **20** is at the top of grooves **42**, **44** the pattern is essentially columnar (FIG. **7**). As the plunger **20** moves down the grooves **42** the spray pattern forms a cone (FIG. **8**). Because the grooves **42** labeled "A" in FIG. **5** do not extend the whole height of the opening **40** in faceplate **16**, no water passes through these "A" grooves when the skirt **24** of plunger **20** is at the top of the groove. Only when skirt **24** of plunger **20** is lowered to a position near the bottom of the opening **40** does water start to flow through the "A" grooves. This selective passage of water through only seven grooves (B–F) when the plunger skirt **24** is raised creates the columnar shower stream illustrated in FIG. **7**. When plunger skirt **24** is lowered, water passes through ten of the grooves (A–F). Grooves "A" are located in openings **40** as shown in FIGS. **2** and **5**. They are oriented away from the center of faceplate **16** and are angled outward to a greater degree than grooves B–F which contributes to the cone-shaped spray pattern shown in FIG. **8**. Typical angles from vertical of the grooves are as follow: A-11°; B-9°; C-6°; D-4°; E-2° and F-1°.

The configuration and positioning of grooves **42**, **44** in the faceplate, coupled with the flexible skirting **24** on plungers **20**, produces a full shower spray even under low flow conditions. More particularly when the three "A" grooves are shutoff as just described, water is forced through seven instead of ten grooves which helps to create a powerful spray pattern.

The positioning of grooves **42**, **44** about the periphery of opening **40**, as shown in FIG. **5**, maximizes the coherency of the spray pattern. More specifically, groove "F" in each opening is oriented toward the geometric center of faceplate **16** as shown in FIG. **2**. The adjacent grooves "D" and "E" are spaced an approximately equal angular distance from groove "F" represented by angle β shown in FIG. **5**. This angle β is greater than the angle α between the remaining grooves "A", "B" and "C". This radial positioning of grooves around the periphery of opening **40** creates a spray pattern with minimal overlap of individual spray streams emanating from the showerhead. More specifically, this positioning reduces the number of individual streams intersecting in the middle of the spray pattern. Thereby each spray stream retains its own shape for a longer distance before colliding with another spray stream flowing from other openings **40**. This results in a better visual appearance of the spray which feels better to the user and promotes better cleansing.

To facilitate soap-up, shampooing and water conservation, one embodiment of this invention contains the shutoff valve illustrated in FIGS. **9–16**. More specifically, in this embodiment the upper portion **62** of the showerhead housing **12** is rotatable relative to the balance of housing **12**. Captured within this rotatable portion **62** of the housing is a cam surface **64** which causes a shuttle valve **66** shaped like a bobbin to move laterally within a fixed bore **70** in the interior showerhead support structure **72** (FIGS. **12–14**). Rotation of the housing **62** causes the cam **64** to rotate, which in turn moves the shuttle valve **66** across the face of water inlet port **74**. One portion **67** of the shuttle valve **66** is cutaway to facilitate passage of water from the water inlet port **74** above the shuttle valve **66** to the water outlet port **76** on the underside of the shuttle valve. Another portion **68** of the shuttle valve **66** will block passage of water through ports **74** and **76** (see FIG. **14**).

Operation of the shuttle valve **66** is extremely simple, yet effective. Water enters the showerhead body **10** through a standard ball joint **80** having a passage **82** there through. The entering water is then in communication with the water inlet **74** formed in an otherwise water impervious cross member **78** formed within the interior showerhead housing **72**. This cross member is thick enough to accommodate the thickness of shuttle valve **66** and water inlet and outlet ports **74** and **76**. It is part of the overall interior showerhead housing **72** which extends from the ball joint **80** to faceplate **16**. The exterior body **12** surrounds housing **72** and faceplate **16** and is held in place by lower bushing **86** as illustrated in FIGS. **12–14**. The upper end of interior housing **72** is sealingly engaged with ball joint **80** by upper bushing **88**. The rotatable portion **62** of the showerhead body **12** fits over interior housing **72** and is held in place by upper bushing **88**.

Returning to the operation of the shuttle valve **66**, water entering ball joint **80** through passage **82** enters inlet port **74**. If the cutaway portion **67** shuttle valve **66** is in a lateral position where it is in communication with inlet port **74** and outlet port **76**, water will flow there through toward the faceplate **16** through the interior of housing **72** (see FIG. **12**). A slight (less than 90°) rotation of upper housing **62** will cause the shuttle valve **66** to laterally move so that the cutaway portion **67** of shuttle valve **66** no longer registers with inlet port **74** pd outlet port **76** thereby cutting off flow through the interior housing **72** (see FIG. **14**). O-rings or like seals **69** prevent by-pass of water along the length of shuttle valve **66**. One example of a suitable cain surface **64** used to adjust lateral movement of shuttle valve **66** is outlined in FIG. **16**. The cam surface **64** is formed in the interior of the rotatable portion **62** of housing **12** (see FIG. **12**).

Thus, by a simple twist of the upper housing **62** it is possible to turn the water flow through the showerhead on or off without altering the spray patterns or intensity. This is unlike other showerheads where the shutoff is in the pipes leading to the showerhead or is accomplished by turning a handle on the side of a showerhead. In the latter embodiments, the handle is usually linked to the spray pattern thereby requiring readjustment of the spray pattern every time the water flow is turned off to soap-up or shampoo. That inconvenience is avoided with applicant's approach.

The showerhead embodiment illustrated in FIGS. **9–15** contains dual shower patterns; the adjustable spray pattern around the periphery of the faceplate and a central vibrating spray. Selection of the desired spray pattern is accomplished using handle **14**. As previously described, rotation of handle **14** may be translated into vertical movement of tubular sleeve **36** via off-center pin **34**.

In this embodiment tubular sleeve **36** surrounds a diverter **50** which is fastened to the interior showerhead housing **72** by screw threads **51** or other attachment means. The upper portion **52** of diverter **50** has an opening therein which is in fluid connection with the water outlet port **76**. When shuttle valve **66** is translated into an open position using the rotatable portion **62** of the showerhead body **12**, water flows into the diverter through opening **52**.

Water exits diverter **52** through one or more outlets **54** in the side thereof. The path taken by water exiting the diverter **52** is determined by the vertical position of the tubular sleeve **36** relative to diverter **50**. When the sleeve **36** holding the plungers **20** is at is uppermost position (FIG. **14**) via rotation of handle **14**, the inner portion of sleeve **36** engages an upper O-ring **55** arranged on diverter **52**. An enlarged bore **38** in the lower half of sleeve **36** is then located above lower O-ring **56** arranged on diverter **52**. This permits passage of water through the center of enlarged bore **38** to the vibrating shower **90** described in more detail below.

When the sleeve **36** is lowered by counter rotation of handle **14** (FIGS. **12–14**) the passage of water to the vibrating spray head **90** is blocked by the mating fit between the smaller bore **39** on the interior of sleeve **36** and lower O-ring **56** on diverter **50**. The water then flows from diverter outlets **54** into the space **35** between the exterior of sleeve **36** and interior housing **72** to the openings **40** in faceplate **16**. Thus, by simple rotation of handle **14** it is possible for a user of applicants' showerhead to select between a regular spray and vibratory spray patterns.

The enlarged lower bore **38** of sleeve **36** is held in position within showerhead **10** by a post **17** formed in faceplate **16**. An O-ring positioned in slot **18** of post **17** seals against backflow of water into the vibrating shower **90** when the main flow of water is to openings **40** in faceplate **16**. The post **17** also coacts with diverter **50** to form guides for movement of sleeve **36**.

Faceplate **16** contains a central opening **19** immediately below post **17** which forms the chamber in which applicants' vibratory spray head **90** is placed. A vibratory spray pattern is generated by the careful placement and orientation of plates **92**, **94** in this opening **18**. As illustrated in FIGS. **12–14** and **17** upper plate **92** contains holes **93** at the center and about the periphery thereof. This plate **92** also contains upstanding dams **91** about its periphery that help guide water to holes **93** and space those holes from the lateral underside of post **17**. Lower plate **94** preferably contains a matching set of holes **95** of slightly larger diameter in the same configuration as the upper plate. The ratio of hole diameter

in lower plate **94** to hole diameter in upper plate **92** is preferably about 2:1, for example a 1/16 inch diameter hole in upper plate **92** and 1/8 inch diameter hole in lower plate **94**. The number and orientation of holes in each plate can be varied but that number and orientation should be substantially the same in both the upper **92** and lower **94** plates.

To obtain a good vibratory spray, it is also desirable to have the mating patterns of holes in the upper and lower plates **92**, **94** vertically aligned when the plates are assembled in the faceplate as shown in FIGS. **11–14**. The best vibratory spray pattern is achieved when the holes in the upper plate **92** are aligned directly above the center of the larger holes in the lower plate **94**. The quality of the vibratory spray pattern deteriorates in direct proportion to misalignment of the holes in the respective plates. When the holes **93**, **95** in upper and lower plates **92**, **94**, respectively, start to misalign with each other, the vibrating spray pattern starts to deteriorate.

Another factor affecting the vibratory spray emanating from spray head **90** is the separation between the upper and lower plates **92**, **94**. Using upper and lower holes **93**, **95** of 1/16 and 1/8 inch diameter, respectively, applicants have found a plate separation of about two tenths of an inch (0.200) to be optimal with a preferred range of about 0.150 to 0.300 inch and an operable range of 0.100 to 0.400 inch. If the holes in the upper and lower plates **92**, **94** are enlarged, this plate separation could be increased. A general ratio of plate separation to diameter of the hole in the lower plate of about 2:1 is preferred. It appears that the vibratory spray pattern is a function of the angle of expansion of the spray exiting each hole **93** in up per plate **92**. This angle of expansion will determine the distance between the upper **92** and lower **94** plates.

As just described, applicants' vibratory spray head **90** emits a well defined vibratory spray pattern that can be used in a showerhead, or as a separate water discharge device, for example, at the end of a flexible hose. So used, the pulsating vibratory stream materially aids in cleansing of articles ranging from cars to humans. Use in a hand-held showering device would materially improve personal hygiene.

Although the invention has been described with reference to specific embodiments, this description is not meant to be construed in a limiting sense. Various modifications of the disclosed embodiments, as well as alternative embodiments, will be apparent to persons skilled in the art. It is, therefore, contemplated that the appended claims will cover all modifications that fall within the true scope of the invention.

We claim:

1. A fluid flow control valve, comprising:

a valve body with at least one fluid inlet and outlet therein;

a movable valve member slidable in a mating bore in the valve body, at least a portion of the valve member having dimensions allowing passage of fluid through the valve body;

a shutoff mechanism arranged on an exterior portion of the valve body; and

a cam surface associated with the shutoff mechanism for engagement with both ends of the movable valve member whereby movement of the shutoff mechanism causes the valve member to move within the valve body to control passage of fluid through the fluid flow control valve.

2. The fluid control valve of claim **1** wherein the movable valve member is an elongated cylindrical bobbin having a portion thereof of reduced diameter.

3. The fluid control valve of claim **2** wherein flow control rings are arranged on each end of the reduced diameter portion of the movable valve member to limit fluid flow outside the reduced diameter portion of the movable valve member.

4. The fluid control valve of claim **3** wherein the flow control rings sealingly, but slidably, engage the inner surface of the bore in the valve body.

5. The fluid control valve of claim **3** wherein the reduced diameter portion of the movable valve member lying between the flow control rings is laterally moved within the mating bore of the valve body by rotational movement of the shutoff mechanism to control passage of fluid through the fluid control valve.

6. The fluid control valve of claim **5** wherein about a 90° rotation of the shutoff mechanism results in sufficient lateral movement of the movable valve member to substantially halt passage of fluid through the fluid control valve.

7. The fluid control valve of claim **1** wherein the rotating shutoff mechanism includes the cam surface on the interior portion thereof.

8. The fluid control valve of claim **7** wherein the shutoff mechanism surrounds the cam surface.

9. A showerhead containing the flow control valve of claim **1**.

10. The showerhead of claim **9**, further comprising:

a pulsating fluid discharge device having a fluid containment passage, a fluid source under pressure connected at one end of the passage and substantially parallel plates at the other end of the passage, the plate closest to the fluid source having at least one bore therein substantially aligned with at least a like number of bores in the parallel plate furthest from the fluid source.

11. The showerhead of claim **10** wherein the parallel plates are spaced from each other by a distance about twice the diameter of the hole in the plate furthest from the source.

12. The showerhead of claim **10** wherein the diameter of the holes in the plate closest to the fluid source is about one-half the diameter of the holes in the plate furthest from the fluid source.

13. The showerhead of claim **10** wherein substantially all the holes in the plate closest to the fluid source are aligned with the holes in the plate furthest from the fluid source.

14. A showerhead comprising:

an outer housing;

a fluid inlet at one end of the housing; and

at least one fluid passage through the housing fluidly connecting the fluid inlet with at least one of a plurality of openings in a faceplate at the other end of the housing, the openings in the faceplate having a pattern of grooves therein which substantially eliminate intersection of fluid streams passing though such openings after they exit the showerhead.

15. The showerhead of claim **14** wherein the pattern of grooves in the openings are concentrically arranged in each of the openings of the faceplate.

16. The showerhead of claim **14** wherein at least one of the grooves in the faceplate opening is oriented to face the geometric center of the faceplate.

17. The showerhead of claim **16** wherein multiple grooves are placed around the faceplate opening with at least a majority of the grooves being located on the semicircular half of the opening facing away from the geometric center of the faceplate.

18. The showerhead of claim **16** wherein the grove facing the center of the faceplate is separated from the other

grooves by a radial distance at least twice the radial distance between other grooves in the faceplate opening.

19. The showerhead of claim **14** wherein flexibly skirted plungers are arranged within the faceplate openings.

20. The showerhead of claim **19** wherein a handle is rotatably mounted on the outer surface of the housing and linked to the plungers wherein rotation of the handle cause linear movement of the plungers within the faceplate openings.

21. The showerhead of claim **19** wherein the internal surface of about half the grooves in the opening of the faceplate are substantially parallel to those openings at their upper end and angled away from the openings at their lower end.

22. The showerhead of claim **21**, wherein movement of the skirted plungers along the interior surface of the openings changes the spray pattern from columnar to cone shaped.

23. The showerhead of claim **20** wherein tabs are located on one end of the plungers whereby the plungers may be rotated within the openings in the faceplate.

24. The showerhead of claim **20**, wherein one end of the flexibly skirted plunger is dimensionally larger than the faceplate opening whereby vertical movement of the plunger wipes the faceplate openings.

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